

# TECHNICAL MEMORANDUM

## Utah Coal Regulatory Program

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February 15, 2005

TO: Internal File

THRU: D. Wayne Hedberg, Permit Supervisor

THRU: Wayne H. Western, Team Lead

FROM: Dana Dean, P.E., Senior Reclamation Hydrologist

RE: North Lease Subsidence Mining, Canyon Fuel Company, LLC, Skyline Mine, C/007/0005, Task ID #1976

### **SUMMARY:**

The following analysis is a review of information received by the Division on July 1, 2004. The information provided consists primarily of reports and studies that were outlined to be conducted when the North Lease was originally permitted for development mining in November 2002. These reports include: a GPS stream-channel profile survey of Winter Quarters Canyon and Woods Canyon in central Utah, and a report titled "*Riparian Plant Community Survey Near Scofield, Utah*". Both reports are submitted as additional baseline information to study the potential effects of subsidence in the North Lease area – primarily in the perennial reaches of Winter Quarters Canyon and Woods Canyon. This review addresses only the hydrologic regulations applicable to the current application. Any hydrologic regulations not addressed here are adequately addressed in the current Mining and Reclamation Plan (MRP). From a hydrologic perspective, the primary concerns were addressed in the November 2002 application, and only minor, time-sensitive modifications were made in the current application. Some comments provided by the land-management agency (the United States Forest Service, USFS) have been incorporated into this technical analysis.

The supplied information does not adequately address the minimum requirements of the regulations. Modifications outlined below need to be addressed before the Division can approve the application.

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**TECHNICAL ANALYSIS:**

## **ENVIRONMENTAL RESOURCE INFORMATION**

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR 783., et. al.

## **GEOLOGIC RESOURCE INFORMATION**

Regulatory Reference: 30 CFR 784.22; R645-301-623, -301-724.

**Analysis:**

No additional geologic information was submitted by Canyon Fuel Company (CFC) as part of the North Lease Subsidence Mining amendment. However, additional information has been provided as part of the June 2004 PHC update (Kravits 2003). The information consists of 89 drill holes; 16 oil and gas exploration holes that penetrate the Starpoint Sandstone, 70 coal exploration holes which primarily terminate in the Storrs Sandstone or Panther Sandstone, and three (3) measured sections. This work has been provided to the Division in both electronic and hard copy formats. Additional geologic illustrations are available in Appendixes J and K, which were generated for the hydrologic modeling exercise.

**Findings:**

The information provided adequately addresses the minimum requirements of the Environmental Resource Information – Geologic Resources Information section of the regulations.

## **HYDROLOGIC RESOURCE INFORMATION**

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-724.

**Analysis:**

The Permittee did not address the primary hydrologic concerns in the North Lease area in the November 2004 Significant Revision to the MRP, since no subsidence in the North Lease was allowed under that revision. Special conditions outlined in Attachment A of the November 2002 analysis indicated that additional Division approval is necessary before the Permittee may perform any full-extraction mining.

### **Baseline Information**

In Section 2.3.5.2 – Groundwater Rights, the Permittee clearly references the location of the water rights status. They are listed in Volume 4, 1<sup>st</sup> and 2<sup>nd</sup> binders, and illustrated on Plate 2.3.5.2-1. Since the Fall of 2002, the Permittee has monitored a total of seven (7) springs and one (1) stock-watering pond in the North Lease area, and has submitted the required data to the Division. The Permittee will perform additional monthly flow monitoring (beginning six-months prior to longwall mining and continuing for six-months after longwall mining passes any perennial sections of Winter Quarters and Woods Canyons) at nine (9) locations in Winter Quarters Canyon and two (2) locations on Woods Canyon. These sites will give additional baseline flow data immediately prior to longwall mining to help analyze subsidence effects on flow, if any.

Also included as baseline information and required based on the November 2002 analysis are three (3) reports: *EarthFax Engineering, Perennial Length and Gradient Studies of Winter Quarters Canyon and Woods Canyon Creek, 2003 and 2003*; *Riparian Plant Community Survey Near Scofield Utah, Winter Quarters and Woods Canyon, 2002*; and *Macroinvertebrates Studies, 2002 and 2003, Winter Quarters and Woods Canyon*, respectively. Copies of the studies are included in Volume A-1 Hydrology Section.

### **Baseline Cumulative Impact Area Information**

In Section 2.5.3 – Alternative Water Supply, the Permittee has identified that they currently own approximately 556 acre-feet of water rights in the Scofield Reservoir. In Section 2.5.3, they also commit to “correct any material damage resulting from subsidence caused to surface lands (which includes water rights), to the extent technologically and economically feasible, by restoring the land to a condition capable of maintaining the value and reasonably foreseeable uses that it was capable of supporting before subsidence damage.” Additional comments include, “Restoring of water flows to impacted sources will be accomplished using Best Technology Currently Available (BTCA)”. As a final alternative, the mine will “explore the transferring of water rights to the injured party in flow equal to the determined loss and/or monetary reimbursement of proven material damages”. The statements made will be implemented for water replacement should any damage occur.

### **Probable Hydrologic Consequences Determination**

In Section 2.5.2, Mining Impacts on Water Quantity, the Permittee specifically discusses the subsidence study conducted in Burnout Canyon – with a discussion of the mining impacts on the aquatic resources found in Section 2.8. The purpose of the Burnout Canyon study was to determine what, if any, impacts would occur to perennial streams in the Skyline Mine area as a result of longwall mining below them. The intent of the study was to determine if significant impacts occurred to Burnout Stream when it was undermined using longwall methods. This

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study was then to be used by the Permittee, the USFS, and OGM to understand the probable hydrologic consequences of undermining perennial streams with similar geologic and geomorphic conditions. As of the September 2003 subsidence survey, two sections of Burnout Creek have subsided a total of six (6) feet and eight (8) feet, respectively. The six-foot subsided section is located in an area of single-seam mining, while an 8-10 foot section is located in an area of two-seam mining. In both cases, the gradient of the stream has been lowered, but no disruption in flow or adverse affects to the aquatic resources have been observed. Mining takes place in the Lower O'Conner B and Upper O'Conner A coal seams in this area. The overburden in both locations consists of approximately 600-feet of undifferentiated Blackhawk Formation.

As a guideline, the U.S. Forest Service (USFS) prefers a ratio of overburden to mine extraction height of 60:1 where longwalling beneath perennial streams (Peng, 1992). In both the Burnout Canyon area and the North Lease, the coal seam is roughly 10-feet thick (Lower O'Conner A in North Lease), indicating the critical overburden depth is approximately 600-feet. In Winter Quarters Creek, one area has only 400-feet of cover, but no subsidence is planned there (this is where the submains are located). All areas of Winter Quarters Canyon where the Permittee plans to longwall mine has overburden in excess of 600-feet. A portion of longwall panel 1R undermines Woods Creek where the overburden is approximately 550-feet. Results from the Burnout Canyon study and subsidence calculations suggest these areas will subside approximately 2-feet and likely reduce gradient, but it is unlikely a diminution of flow would occur.

The Permittee needs to further discuss the potential effects of subsidence to both Winter Quarters Canyon and Woods Canyon Creeks, using information from Appendix Volume A-2 on Perennial Length and Gradient Studies of Winter Quarters Canyon and Woods Canyon Creeks, and estimates of proposed subsidence (figure 2.3.6-2). As an example, in Woods Canyon Creek approximately 3-feet of subsidence is anticipated in an approximately 1,500-ft stretch of creek with an overall 7% grade. Similarly in Winter Quarters Canyon, 4-ft of subsidence is anticipated over an approximate 2,200-ft stretch of creek with an overall 6.7% grade.

**Findings:**

The information provided does not adequately address the minimum requirements of the Hydrologic Resource Information section of the regulations.

**R645-301-728.333**, Provide a more detailed discussion of the effects of subsidence to Woods Canyon and Winter Quarters Canyon Creeks, specifically addressing the potential of lowering the stream gradient.

## MAPS, PLANS, AND CROSS SECTIONS OF RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.24, 783.25; R645-301-323, -301-411, -301-521, -301-622, -301-722, -301-731.

### Analysis:

#### Coal Resource and Geologic Information Maps

Drawings 2.3.4-1A through 1-C were updated in November 2002 to provide graphic representation in cross section of the North Lease area. Additional geologic information is available in the Kravits report (November 3, 2003) and generalized cross sections in Appendix K (Hydrologic Model report) Figures 9-12.

### Findings:

The information provided adequately addresses the minimum requirements of the Maps, Plan, and Cross Sections of Resource Information section of the regulations.

## OPERATION PLAN

## HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 773.17, 774.13, 784.14, 784.16, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-300-140, -300-141, -300-142, -300-143, -300-144, -300-145, -300-146, -300-147, -300-148, -301-512, -301-514, -301-521, -301-531, -301-532, -301-533, -301-536, -301-542, -301-720, -301-731, -301-732, -301-733, -301-742, -301-743, -301-750, -301-761, -301-764.

### Analysis:

#### General

The Permittee has not added any water monitoring sites to their plan since November 2002. However, sites were implemented at that time which should adequately address any potential the effects to the hydrologic regime from mining, directly or from subsidence. Tables 2.3.7-1, 2.3.7-2, and 2.3.7-3 have been modified to include additional monitoring associated with the North Lease – samples are obtained at the monitoring sites three (3) times a year. The Permittee should provide a brief explanation of the rationale for the selection of the water monitoring sites – both ground- and surface- water sites.

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### **Groundwater Monitoring**

A total of six (6) springs have been added to the groundwater-monitoring program for the North Lease area. Samples have been collected since 2002.

### **Surface Water Monitoring**

The Permittee has added a total of two (2) surface-water monitoring sites. One of these is located in Woods Canyon and one in Winter Quarters Canyon. The Permittee will monitor both water quality and quantity three (3) times a year at those sites. Samples have been collected since 2002. In addition, a total of nine (9) flow-only monitoring sites will be monitored monthly on the same streams during the subsidence phase of mining. This will be initiated 6-months prior to- and continue for 6-months after undermining perennial sections of the streams. This will help detect any potential diminution of flow caused by subsidence.

### **Findings:**

The information provided does not adequately address the minimum requirements of the Operation Plan – Hydrologic Information section of the regulations. Prior to approval the following must be provided in accordance with:

**R645-301-731.200**, Provide a brief explanation of the rationale used in selecting both the ground- and surface- water monitoring sites.

## **MAPS, PLANS, AND CROSS SECTIONS OF MINING OPERATIONS**

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-512, -301-521, -301-542, -301-632, -301-731, -302-323.

### **Analysis:**

#### **Mine Workings Maps**

Provided in November 2002.

#### **Monitoring and Sampling Location Maps**

Plate 2.3.6-1 was updated in November 2002 to included six (6) additional springs and 2 stream sites in the water-monitoring program for the North Lease. The sites have been monitored 3-times a year since that time. Drawing 2.3.6-2 – North Lease Subsidence Hydrologic Monitoring Points was also added in November 2002 outlining seven (7) sites outlined to

monitor flow-only six month prior to- and six months after mining to monitor any disruption of flow caused by subsidence.

**Findings:**

The information provided by CFC is adequate to meet the minimum requirements of the Utah Coal Mining Rules.

## **CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT**

Regulatory Reference: 30 CFR Sec. 784.14; R645-301-730.

**Analysis:**

The Division Cumulative Hydrologic Impact Assessment (CHIA) will be updated in the very near future based primarily on activities related to the southern portion of the Skyline Mine.

No additional hydrological impacts are anticipated with the addition of the North Lease.

**Findings:**

The information provided adequately addresses the minimum requirements of the Cumulative Hydrologic Impact Assessment section of the regulations.

**RECOMMENDATIONS:**

The amendment does not adequately address all regulations. The plan should be updated to include all required information before the Division approves it.